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The Impact of Artificial Intelligence on Higher Education Students in Libya: A Case Study of the Computer Science Departments at the Higher Institute of Industrial Technology in Enjeila and Al-Jafara University

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الملخص:

هدفت الدراسة الى دراسة تايثر استخدام الذكاء الاصطناعي في التعليم العالي وفي تحسين مستوي وتعليم ومردودية الطلبة وكيفية تعاملهم مع تطبيقاته بصور متعددة كما تطرقت هذه الدراسة الى معرفة نسبة الطلبة المستخدمين لذكاء الاصطناعي في حل واجباتهم وكيف يتم استخدامهم له كما سنكشف في هذه الدراسة على الاثار السلبية والايجابية لاستخدام الذكاء الاصطناعي في التعليم العالي من وجهة نظر الطلبة , و التحديات الاخلاقية والعلمية المرتبطة باستخدام الذكاء الاصطناعي, و معوقات استخدامه في التعليم العالي . تم جمع البيانات اللازمة باستخدام استبيان ةتم تطبيقه على عينة الدراسة والتي بلغت .(127) حيث كشفت نتائج الدراسة ان القطاع التعليمي أصبح يتأثر بشكل كبير بالذكاء الاصطناعي واصبح الطلاب يعتمدون بشكل كبير عليه في إعداد واجباتهم بشكل خاص ودراستهم بشكل عام ,وان ادوات الذكاء الاصطناعي تعزز الكفاءة ,الكتابة, والتعليم الشخصي لديهم بشرط وجود تدريب اكاديمي حول كيفية الاستخدام الاخلاقي والمسؤول لأدوات الذكاء الاصطناعي , ووجود تخوف عام من تراجع القدرات الذاتية اذا اصبحت هذه الادوات بديلا كاملا عن الجهد الفردي . وتوصي الباحثات بضرورة توعية الطلاب بمخاطر الاستخدام المفرط , وان يتم استخدام الذكاء الاصطناعي والاستفادة منه بطريقة صحيحة وكأداة مساعدة وليس بديلا عن الجهد الفردي , وكذلك لابد من تحديد وضبط السياسة التعليمية الواضحة ,وتعليم لأخلاقيات استخدام الذكاء الاصطناعي .

Abstract:

This study aims to investigate the impact of artificial intelligence (AI) on higher education in Libya, specifically on the level of education, student productivity, and their interaction with AI applications in various forms. The study also explores the percentage of students using AI to solve their assignments and how they use it. Additionally, the study reveals the positive and

negative effects of AI use in higher education from the students' perspective, the ethical and scientific challenges associated with AI use, and the obstacles to its use in higher education.

Data was collected using a questionnaire applied to a sample of 127 students. The study's results show that the education sector is significantly influenced by AI, with students heavily relying on it for preparing assignments and studying in general. AI tools enhance efficiency, writing, and personalized learning, provided there is academic training on ethical and responsible use. However, there is a general concern about the potential decline in individual capabilities if AI tools become a complete substitute for human effort. The researchers recommend raising awareness among students about the risks of excessive AI use. Using AI as a supportive tool, not a replacement for individual effort, and establishing clear educational policies and teaching ethics of AI use.

Keywords: Artificial Intelligence, Higher Education in Libya, Higher Institute of Industrial Technology in Enjeila, Al-Jafara University

Introduction: The world is witnessing a technological development in the current era, where Artificial Intelligence (AI) has become one of the most prominent tools contributing to change. It is one of the most important developments of the 21st century, which has become indispensable in many sectors, including the education sector. AI helps develop management systems and performance for learners and teachers, positively impacting the educational process. AI applications in education (AIEd) are widely used by learners and teachers, enabling access to multiple educational resources easily and at a low cost, reducing the gap between students in different educational environments. AI also provides advanced analytical tools that help understand students' needs and provide personalized support. Moreover, AI technologies can play a crucial role in improving the efficiency of the educational process and developing teaching methods that meet the requirements of the era. AI also provides customized educational experiences that cater to individual differences between students, enhancing academic performance and psychological well-being.

Studies have shown that AI-powered educational platforms can assess students and adapt content according to their specific needs (Shahzad et al.,

2024). Many research findings indicate the increasing impact of AI on various aspects of our daily lives, including education. With the rise of digital technologies, higher education has also undergone a significant transformation, with AI playing a crucial role in this shift. AI has been applied in higher education in various ways, focusing on improving student engagement, increasing efficiency, and enhancing learning experiences. AI can be used to support the general goals of higher education, such as promoting critical thinking and creativity through improving students' cognitive abilities and skills (Al Ka bi, 2023, p. 69). This research will study the impact of using AI on student education, focusing on its role in enhancing access to educational content and improving individual support for students in higher education in Libya.

Research Problem

The researchers' awareness of the problem stems from their work in the Computer Science Department at the Higher Institute of Industrial Technology in Enjeila and the Computer Science Department at Al-Jafara University. While teaching courses, it was observed that most students use AI tools to solve their assignments, and some students have skills in using these tools, while others lack the ability to use them effectively. Given the rapid development of educational technology applications and the emergence of new applications that can increase the efficiency of the educational process, including AI applications, there is a pressing need to understand the impact of AI on higher education students in Libya and its ability to achieve educational goals and meet students' needs.

Research Questions

The study aims to answer the following questions:

- What is the impact of using AI on higher education students in Libya?

- How does AI contribute to facilitating access to educational resources and references and meeting the individual needs of higher education students in the Computer Science Department at the Higher Institute of Industrial Technology in Enjeila and Al-Jafara University?

- What are the most commonly used AI tools, and what are the main purposes for which they are used by students at the Higher Institute of Industrial Technology in Enjeila?

- What are the ethical and scientific challenges associated with using AI?

- What is the level of obstacles to using AI tools in higher education?

Study Objective

The study aims to reveal the effectiveness of using artificial intelligence (AI) in higher education and evaluate its impact on students' learning outcomes in the Computer Science Department at the Higher Institute of Industrial Technology in Enjeila and Al-Jafara University. The study also aims to assess the ethical and scientific challenges associated with using AI tools and identify the level of obstacles to its use in higher education.

Importance of the Study

The importance of the study lies in:

- Highlighting the importance of using AI techniques and their impact on higher education students.

- Contributing to the evaluation of the ethical and scientific challenges associated with using AI tools in higher education.

- Benefiting from the study's findings to identify obstacles to using AI in the educational process in Libyan higher education institutions.

Study Methodology

The study used a descriptive analytical approach, employing a questionnaire as a tool for collecting information. The researchers also utilized books, journals, and scientific theses related to the study's topic by reviewing previous studies and research. The questionnaire was used to survey the opinions of the study sample, and the Statistical Package for the Social Sciences (SPSS) program was used to analyze the answers statistically and obtain results and formulate recommendations. The study relied on a descriptive analytical approach, which involves collecting data from a sample of students from the Computer Science Department at the Higher Institute of Industrial Technology in Enjeila and the Computer Science Department at Al-Jafara University using a questionnaire prepared for this study. The study analyzed the responses of the students. The study was applied to a random sample, and 127 valid questionnaires were retrieved for analysis.

Study Limitations

The results of this study can be generalized in light of the following limitations:

- Human boundaries: The study was applied to 127 male and female students.

- Spatial boundaries: The study was applied in the Computer Science Department at the Higher Institute of Industrial Technology in Enjeilah and the Computer Science Department at Al-Jafara University.

- Time boundaries: The study was applied in the academic year 2025.

Previous Studies

Artificial intelligence is defined as a field in computer science that aims to create systems or machines capable of performing tasks that typically require human intelligence (Russell & Norvig, 2021). These tasks include the ability to learn, solve problems, reason, perceive visually, and understand natural language. The ability to simulate human cognitive instructions is a fundamental

core of this field, where intelligent systems aim to recognize patterns, make decisions, and adapt to changing environments independently.

From another perspective, some researchers see AI as extending beyond mere simulation of the human mind to include the development of systems that work rationally to achieve specific goals (Poole, Mackworth, & Goebel, 1998).

There are many benefits and advantages of using AI in higher education, including:

Personalized learning paths: This aspect is one of the most important applications of AI, where intelligent systems provide customized learning experiences for each student. By analyzing data related to a student's performance and learning patterns, systems can recommend educational content, resources, and activities tailored to their individual abilities, ensuring a deeper understanding of the subject matter (Tantawi, 2025).

Intelligent tutoring systems: These systems work as automated teachers, providing support and guidance to students around the clock. They not only provide answers but can also identify weaknesses in students and provide additional exercises to increase their understanding.

Previous Studies in Libya

- **Artificial Intelligence in Higher Education in Libya: Opportunities and Challenges (Sebha University Conference Proceedings, 2025)**

Authors: Entsar Alahwal, Lamess Mansour, Amna J. AlOjali, Fathia Lahwal.

The study used SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) to evaluate the potential use of AI in Libyan higher education. It concluded that there are more opportunities than threats and that AI applications are beneficial for students and faculty members, provided there is control, clear laws, and respect for academic integrity and equality.

- **Artificial Intelligence Technologies and Their Impact on Higher Education in Libya: A Field Study at the University of Benghazi (AJAPAS, 2025).**

Authors: Abdalslam S. Imhmed Mohamed, et al. AAAS Journals

The study investigated how AI technologies affect the quality of higher education at the University of Benghazi. The results showed an improvement in student participation, assessment efficiency, and higher academic performance by approximately 15%. However, barriers such as poor infrastructure, internet disruption, and lack of sufficient training for faculty members and students were identified.AAAS Journals

Arab Studies

- A study in Saudi Arabia found that students have a high conceptual awareness of AI tools and display a positive attitude, appreciating benefits such as summarization and time-saving, while expressing concerns about weakened critical thinking and data privacy (Al-Qahtani & AL-Dayel, 2024).

- A study in the UAE showed that students use AI tools to improve their learning experience and customize content according to their needs. However, this is accompanied by concerns about ethics and institutional use safety (Abbas et al., 2024). The study confirmed a widespread use criterion: 27.3% "very much" and 36.4% "much", with a clear detail for ChatGPT at 93.8%, due to its easy interface, free availability, and media influence (Smith et al., 2025).

The study found a cautious trend among students towards using AI tools, fearing incorrect information and decline in critical thinking. It was also observed that academic performance is not positively affected by using tools without proper training (Lee et al., 2025).

International Study

- A study in Sichuan Province confirmed that integrating AI in education can enhance student creativity by promoting educational engagement, provided there is a reasonable familiarity with the tools (Zhang et al., 2025). The study used a standard model to understand factors influencing students' adoption of AI tools, with questions about knowledge, access, impact, and academic addiction. It confirmed that availability of subscription and ease of use positively influence adoption (Wang et al., 2025).

Table 1: Number of Distributed, Returned, and Unreturned Questionnaires

Number of Questionnaires	Distributed	Returned	Unreturned	
Total	130	130	127	3
Percentage		100%	97%	2%

Source: Prepared by the researchers.

Study Tool:

The researchers developed a questionnaire to investigate the impact of using artificial intelligence on higher education students in Libya.

Scale of the Study Tool:

A five-point Likert scale was adopted, with degrees: Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree, given the weights (1, 2, 3, 4, 5).

Reliability and Validity of the Study Tool:

To verify the reliability of the study tool, Cronbach's alpha coefficient was used as follows:

Table 2: Cronbach's Alpha Coefficient Results for Verifying the Reliability of the Study Axes

Rank	Axis	Number of Items	Cronbach's Alpha Coefficient
1	Contribution of AI to facilitating access to educational resources and references and meeting individual needs of higher education students.	8	89%
2	Most commonly used AI tools by students	9	90%
3	Ethical and scientific challenges associated with using AI	9	91%
4	Level of obstacles to using AI tools in higher education	10	94%
	Overall statistical average for all variables	36	91%

We note that the Cronbach's alpha coefficient values reached 91%, which represents the statistical average for all items. This is considered high, indicating a high degree of reliability and internal consistency among the study sample members, making it suitable for achieving the study's objectives.

Study Results: Analysis of Questionnaire Responses

The study used means, standard deviations, percentages, and level of agreement to analyze the study variables.

The following tables illustrate the results

Table 3: Means and Standard Deviations for Items in the Domain "Contribution of AI to Facilitating Access to Educational Resources and References and Meeting Individual Needs of Students"

Rank	Item |	Mean	Standard Deviation	Percentage	Level of Agreement
1	I feel confident when using AI tools to complete my academic tasks	3.93	1.19	78.6	Agree

2	Using AI has significantly improved my academic achievement	4.06	1.12	81.4	Agree
3	AI has helped me find reliable sources quickly and effectively	3.91	1.22	78.2	Agree
4	AI has helped me understand complex concepts better	4.05	1.11	81.0	Agree
5	| I feel that AI saves me time and effort during studying	4.03	1.13	80.6	Agree
6	AI enhances my ability for self-directed learning and future education	4.10	1.07	82.0	Agree
7	| I think integrating AI in education makes the learning process more engaging and interactive	3.90	1.19	78.0	Agree
8	AI applications motivate students to increase their level of motivation towards learning	3.99	1.16	79.8	Agree

The data in Table 3 indicates the following results:

1. The mean values for the items in the domain "Contribution of AI to facilitating access to educational resources and references and meeting individual needs of students" ranged from 4.10 to 3.90, with varying degrees of agreement.

2. The top three items in this domain, according to the study sample's opinions, were:

- "AI enhances my ability for self-directed learning and future education" (mean = 4.10, standard deviation = 1.07), which falls under the "Agree" level.

- "Using AI has significantly improved my academic achievement" (mean = 4.06, standard deviation = 1.12), which falls under the "Agree" level.

- "AI has helped me understand complex concepts better

Table 4: Means and Standard Deviations for Items in the Second Domain "Most Commonly Used AI Tools and Main Purposes for Which They Are Used by Students"

Rank	Item	Mean	Standard Deviation	Percentage	Level of Agreement
1	Students use ChatGPT as a type of AI tool frequently in their studies	3.89	1.21	78.1	Agree
2	The main purpose of using AI tools is to search for quick information and sources	3.92	1.22	78.2	Agree
3	General use of AI tools in university studies	4.09	1.07	82.0	Agree
4	Using AI tools for design and creating media (images, presentations, videos	3.94	1.20	78.8	Agree
5	AI tools are used to assist with programming or solving technical problems	4.12	1.09	82.2	Agree
6	AI facilitates access to diverse educational references that suit my academic level	4.15	1.20	83.0	Agree
7	Students' satisfaction with the quality of results provided by AI tools	4.10	1.07	82.0	Agree
8	Dependence on AI-powered translation tools	4.01	1.19	79.9	Agree
9	Using AI tools like ChatGPT and image generation tools for regular educational support	3.90	1.18	8.10	Agree

The data in Table 4 indicates the following results:

1. The mean values for the items in the domain "Most Commonly Used AI Tools and Main Purposes for Which They Are Used by Students" ranged from 3.89 to 4.15, with varying degrees of agreement.

2. The top three items in this domain, according to the study sample's opinions, were:

- "AI facilitates access to diverse educational references that suit my academic level" (mean = 4.15, standard deviation = 1.20), which falls under the "Agree" level.

- "AI tools are used to assist with programming or solving technical problems" (mean = 4.12, standard deviation = 1.09), which falls under the "Agree" level.

- "Students' satisfaction with the quality of results provided by AI tools" (mean = 4.10, standard deviation = 1.07), which falls under the "Agree" level.

3. The items that received the lowest ratings in this domain, according to the study sample's opinions, were:

- "Students use ChatGPT as a type of AI tool frequently in their studies" (mean = 3.89, standard deviation = 1.21), which falls under the "Agree" level.

- "Using AI tools like ChatGPT and image generation tools for regular educational support" (mean = 3.90, standard deviation = 1.18), which falls under the "Agree" level.

- "The main purpose of using AI tools is to search for quick information and sources" (mean = 3.92, standard deviation = 1.22), which falls under the "Agree" level.

This result indicates that students use AI tools frequently in their studies, especially for searching for quick information and sources, as well as for

assistance with programming or solving technical problems, translation, and designing and creating media.

Results of the third question: What are the ethical and scientific challenges associated with using AI?

The researchers extracted the means and standard deviations for the domain of ethical and scientific challenges associated with using AI, as follows:

Table 5: Means and Standard Deviations for Items in the Third Domain "Ethical and Scientific Challenges Associated with Using AI"

Rank	Item	Mean	Standard Deviation	Percentage	Degree
1	I feel concerned that using AI may lead to academic cheating	4.09	0.78	76.4	Medium
2	| I feel that AI reduces critical thinking skills among students	3.76	0.81	62.2	Medium
3	I think that professors are not fully prepared to assess students' work that uses AI	3.98	0.80	75.6	Medium
4	I believe there is a scientific benefit in using AI as a tool to assist learning	| 3.38	0.83	42.5	| Low
5	I think that using AI may lead to a loss of academic responsibility among students	3.18	0.89	39.4	Low
6	I can distinguish between correct and incorrect use of AI tools in my students	3.38	0.83	42.5	Low

7	Dependence on AI may weaken basic skills	3.94	0.92	71.4	Medium
8	How often do you review and verify AI outputs?	3.15	1.10	35.7	Low
9	Using AI to generate content as one's own work is plagiarism	3.00	1.18	43.7	Low

The data in Table 5 indicates the following results:Table 5 highlights the results of the axis of ethical and scientific challenges associated with the use of artificial intelligence among higher education students, where the arithmetic means ranged between (3.00-4.09), indicating a moderate level of awareness of ethical risks. The concern about academic cheating resulting from the use of artificial intelligence was the highest source of concern (M = 4.09, SD = 0.78), followed by the weakness of professors' readiness to evaluate works generated by artificial intelligence (M = 3.98), and then the fear of weakening basic skills due to over-reliance on these tools (M = 3.94). In contrast, the statements related to the benefits of artificial intelligence in supporting learning or students' ability to distinguish between correct and incorrect use scored lower (M = 3.38), indicating a relative lack of awareness of the educational value of artificial intelligence. The statement "considering content generated by artificial intelligence as personal work that constitutes plagiarism" received the lowest rating (M = 3.00), reflecting ambiguity in ethical awareness among some students. Overall, the results show a moderate awareness of ethical and scientific risks, with a pressing need to establish a culture of "digital ethics" and enhance training for students and faculty members on the responsible use of artificial intelligence in the academic environment.

Results of the fourth question: What are the obstacles to using AI tools in higher education?The researchers extracted the means and standard

deviations for the domain of obstacles to using AI tools in higher education as follows:

Table 6: Means and Standard Deviations for Items in the Fourth Domain "Level of Obstacles to Using AI Tools in Higher Education"

Rank	Item	Mean	Standard Deviation	Percentage	Degree
1	| I face technical difficulties (network, devices, access) when using AI tools	3.8	1.1	65	Agree
2	Lack of tools in Arabic limits my ability to benefit from them	4.1	1.0	70	Agree
3	I lack the necessary skills to use AI tools in my studies	3.5	1.3	60	Agree
4	I haven't received sufficient training on using AI in education	3.9	1.2	68	Agree
5	I'm concerned that relying on AI may reduce my personal abilities in analysis and understanding	3.0	1.4	45	Agree
6	I don't have enough motivation to use AI tools regularly	2.8	1.5	40	Disagree
7	I think my educational institution doesn't provide sufficient support for using AI tools	3.7	1.2	62	Agree
8	Lack of clear policies from the institution limits the use of these tools	3.6	1.1	58	Agree
9	I'm afraid that using AI tools may lead to academic integrity issues	3.2	1.3	50	Agree

10	I'm concerned about privacy and data security when using these tools	3.4	1.2	55	Agree

|Table 6 illustrates the most significant obstacles that limit the employment of artificial intelligence tools in higher education, based on the responses of (127) students. The means ranged between (2.8-4.1), reflecting an awareness of the benefits of technology accompanied by clear institutional and technical obstacles. The highest obstacles were "lack of tools available in Arabic" (M = 4.1), highlighting the language barrier as one of the most significant challenges limiting digital inclusivity. This was followed by "lack of training on using artificial intelligence in education" (M = 3.9), and "technical difficulties related to network and devices" (M = 3.8). The results also showed weak institutional support (M = 3.7) and lack of clear policies (M = 3.6) as factors hindering the effective integration of artificial intelligence. Ethical concerns, such as academic integrity and data privacy, appeared to a moderate degree, while the intrinsic motivation to use artificial intelligence was relatively high, reflecting a positive attitude towards technology among students. Overall, the results indicate that language, infrastructure, and institutional training challenges are the main obstacles to the effective use of artificial intelligence in Libyan universities, necessitating the development of clear policies, training programs, and supportive infrastructure for the integration of artificial intelligence in higher education.

Conclusion:

The almost complete reliance on artificial intelligence tools by students to complete educational tasks may affect the development of critical thinking and autonomy among learners. However, there are benefits to using AI applications in higher education, such as improving access to educational content and providing individual support to students.

In light of the rapid digital transformations, artificial intelligence has become a cornerstone in developing higher education systems worldwide. This study aimed to investigate the impact of using AI tools on teaching higher education students in Libya, as a step towards understanding the reality of benefiting from this technology in the local context.

The study's results showed that AI has a positive impact on enhancing the efficiency of the educational process, motivating students to learn, and personalizing educational paths. However, there are multiple obstacles that limit optimal benefit, ranging from weak technical infrastructure and lack of institutional policies to limited technical awareness among students and faculty members.

Based on the above, the researchers recommend the need for concerted efforts between educational institutions, decision-makers, and technical authorities in Libya to enable a smart and sustainable educational environment that relies on AI as an enabling tool, not a replacement for teachers, but rather a partner in the educational process.

Recommendations:

Based on the study's results and analysis, the researchers recommend the following:

1. Integrating AI into Curricula: Incorporating specialized academic courses in AI that include educational applications and basic technical skills to enable students to use these technologies effectively.

2. Qualifying Faculty Members: Conducting intensive training courses for faculty members to equip them with the necessary skills to use AI tools in planning, teaching, and academic assessment.

3. Updating Technical Infrastructure in Libyan Universities: Investing in improving internet networks, providing advanced computer labs, and adopting open educational AI software.

4. Establishing National Smart Educational Platforms: Developing e-learning platforms that use AI to tailor content according to student needs, enhance interaction, and promote participation.

5. Raising Awareness about Ethical Use of AI: Preparing awareness campaigns and dialogues to educate students about the ethical boundaries of using AI, especially in research and academic assignments.

6. Developing University Policies Regulating AI Use: Formulating clear regulations that define what is allowed and prohibited to avoid misuse and ensure academic fairness.

7. Supporting Scientific Research in AI: Encouraging graduation projects, master's theses, and scientific studies targeting AI applications in the Libyan environment, and providing incentives for researchers in this field.

8. Enhancing Cooperation with International Institutions: Establishing research and training partnerships with international universities and technology companies to transfer knowledge and exchange experiences in AI.

9. Utilizing AI to Support Individual Differences: Using AI techniques to provide customized content that suits different learning styles, thereby enhancing the efficiency of the educational process.

10. Conducting Periodic Evaluations of AI Effectiveness: Establishing units within educational institutions to monitor the impact of using AI tools on student performance, interaction, and learning outcomes.

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